

Vale and *Yates Center, and 20° Leavenworth. *Wisconsin*: —12° at *Ashland and *Neillsville, —6° at *La Crosse, and 6° at Madison. *Iowa*: —6° at *Cresco, —3° at *Ft. Dodge, 6° at *Glenwood, 10° at Des Moines and Dubuque, and 21° at Keokuk. *Nebraska*: —19° at *Ft. Sidney, —2° at *Genoa and North Platte, and 5° at Omaha. *Indian Territory*: 23° at Ft. Sill and 26° at Ft. Gibson. *Minnesota*: —19° at Duluth and —12° at St. Paul. *Dakota*: —35° at Ft. Buford, —32° at Pembina, —21° at Bismarck, —7° at Deadwood, —5° at *Morrison and —2° at Yankton. *Colorado*: —17° at Ft. Garland, —15° on Pike's Peak, —7° at *Ft. Lyon and —5° at Denver and *Hermosa. *New Mexico*: —2° at Santa Fé, 7° at Silver City and 20° La Mesilla. *Wyoming*: —25° at *Ft. Fred Steele and —11° at Cheyenne. *Utah*: —16° at *Coalville and 2° at Salt Lake City. *Nevada*: 0° at Winnemucca. *Arizona*: —17° at Prescott, 8° at Ft. Verde, and 30° at Yuma. *Idaho*: —11° at *Ft. Hall and 13° at Boise City. *Montana*: —18° at Virginia City. *California*: 25° at Sacramento and *Salinas City, 26° at Red Bluff, 27° at Visalia and *Princeton, 30° at Los Angeles and 37° at San Francisco. *Oregon*: 18° at Umatilla, 25° at Roseburg and 28° at Portland.

Those marked with a star (*) are reported by Voluntary Observers or U. S. Army Post Surgeons.

Ranges of Temperature at Signal Service Stations.—The monthly ranges will appear from an examination of the maxima and minima just given. The greatest daily ranges vary in New England from 25° at Wood's Holl to 36° at Eastport and 40° at New London and Boston; Middle Atlantic States, 20° at Barnegat to 27° at Washington, Baltimore and Sandy Hook, and 36° at Albany; South Atlantic States, 22° at Savannah to 26° at Jacksonville, and 31° at Wilmington and Augusta; Eastern Gulf States, 13° at Key West and 18° at New Orleans and Cedar Keys to 31° at Montgomery; Western Gulf States, 16° at Galveston to 31° at Vicksburg and 32° at Corsicana; Ohio valley and Tennessee, 22° at Columbus to 25° at Memphis, 30° at Knoxville, 33° at Pittsburg and 36° at Morgantown; Lower Lake region, 23° at Detroit to 31° at Oswego and 34° at Rochester; Upper Lake region, 24° at Grand Haven to 29° at Madison, 33° at Alpena, 38° at Marquette and 48° at Duluth; Upper Mississippi valley, 28° at Dubuque to 31° at St. Louis, 37° at St. Paul and 40° at LaCrosse; Missouri valley, 35° at Leavenworth to 39° at Yankton, 52° at Bismarck and 62° at Pembina; Texas, 31° at San Antonio and Denison to 40° at Rio Grande, 50° at Uvalde, 51° at Fort Elliott and 55° at Decatur; Eastern Rocky Mountain slope, 32° at Fort Gibson and Fort Sill to 36° at Deadwood and 44° at Dodge City and North Platte; Rocky Mountains, 25° on Pike's Peak to 32° at Virginia City, 34° at Cheyenne and 42° at Denver; Northern and Middle Plateau districts, 23° at Boise City to 25° at Salt Lake City and 33° at Winnemucca; California, 15° at San Francisco to 22° at Sacramento, 31° at Los Angeles, 33° at Red Bluff and 36° at Visalia.

Frost was reported very generally from all States and Territories north of the 35th parallel. In Florida, on the 19th, but causing no injury to vegetation; Gulf States, 14th, 19th, 21st to 27th; interior of Texas, 13th, 14th, 22nd, 23rd, 24th, 25th, 26th, 31st; New Mexico, 1st, 5th, 11th, 12th, 13th, 20th, 22nd, 23rd, 26th, 27th, 30th, 31st; Arizona, 2nd, 3rd, 4th, 5th, 6th, 9th, 12th, 13th to 20th, 22nd to 31st; California, 1st, 2nd, 7th, 9th, 11th, 12th, 13th, 14th, 15th, 16th, 19th, 20th, 21st, 26th to 31st; at Salinas, Cal., frost was reported as frequent and severe; at Los Angeles, on the 31st, it injured tender vegetation, but fruit trees not seriously.

Ice formed generally throughout the northern sections of the country as will be seen by reference to the chapter on navigation. In the South Atlantic States on the 13th, 14th, 25th, 26th; Mississippi, 14th, 23rd, 24th, 25th, 26th, 27th; California, 10th, 11th, 12th, 13th, 28th, 29th, 30th, 31st.

Ground Frozen.—Litchfield, Pa., 30th, ground frozen to a depth of 4 inches; Bloomfield, Wis., ground frozen only at intervals throughout the month; Fall River, Mass., frost in ground during first half of month.

PRECIPITATION.

The general distribution of the rain-fall, including melted snow, is illustrated upon chart No. III, as accurately as possible from about 500 reports. In the left-hand corner is a table of average rain-falls, by districts. This table shows the rain-fall for the present January to have been below the average in the Atlantic and Gulf States, Tennessee, (eastern part,) Lower Lake region, Upper Missouri valley and California; the largest deficiencies occurring in the East Gulf States and California. In the other districts, namely, the Upper Lake region, the Ohio, Upper Mississippi and Lower Missouri valleys, and on the coast of Oregon there is an excess, which is most marked in the last named section.

Special Heavy Rains.—1st and 2nd, Eugene City, Or., 4.20 inches. 1st to 3rd, Brackettsville, Tex., 5.00 in. 2nd, Louisville, Ill., 2.00 in. in five hours; Concho, Tex., 3.60 in. 2nd and 3rd, Lyndon, Ill., 2.62 in. 3rd, Riley, Ill., 2.97 in.; Austin, Tex., 2.00 in.; Castroville, Tex., 2.08 in.; San Antonio, Tex., 2.20 in.; Boerne, Tex., 2.53 in. 3rd and 4th, Marengo, Ill., 3.02 in.; New Ulm, Tex., 4.75 in.; Indianola, 4.08 in. 4th, Fort Wayne, Ind., 3.00 in. 5th, Memphis, 2.92 in. 5th and 6th, New Corydon, Ind., 2.49 in.; St. Meinrad, Ind., 3.35 in.; Portland, Or., 3.34 in. 5th to 7th, Eugene City, Or., 4.55 in. 8th and 9th, Princeton, Cal., 2.80 in. 20th to 22nd, Wellsboro', Pa., 4.50 in.; White Plains, N. Y., 3.10 in. 22nd, Auburn, N. H., 3.04 in. 25th and 26th, Quitman, Ga., 3.90 in.; Thomasville, Ga., 3.67 in. 26th, Wilmington, N. C., 2.55 in. 26th and 27th, Smithville, N. C., 3.63 in. 27th, Wellsboro', Pa., 2.40 in. 27th and 28th, Auburn, N. H., 6.00 in. White Plains, N. Y., 2.70. 29th, Pike's Peak, 27th to 29th, 3.64 in.

Largest Monthly Rain-falls including melted snow.—Olympia, Wash. Ty., 19.69 inches; Auburn, N. H., 14.16; Portland, Or., 12.27; Roseburg, Or., 9.37; Wellsboro, Pa., 8.71; College Hill, Ohio, 8.28; New

Corydon, Ind., 7.84; Memphis, 6.87; Summit, Cal., 6.60; New Ulm, Tex., 6.44; St. Meinrad, Ind., 6.40; Brackettsville, Tex., 6.39; Spiceland, Ind., 6.00; Morgantown, 5.77; Jacksonburg, Ohio, 5.75; Princeton, Cal., Vevay and Fort Wayne, Ind., and North Lewisburg, Ohio, 5.50; Quitman, Ga., 5.40; Portland, Me., 5.36; Urbana, Ohio, 5.35; Bellefontaine, Ohio, 5.33; Weir's Bridge, N. H., 5.23; Smithville, N. C., 5.05; Cape Lookout, N. C., 5.01.

Smallest Monthly Rain-falls including melted snow.—Fort Halleck, Nev., none; Fort Elliott, Tex., Fort Lyon, Col., Yuma, Ariz., Fort McDermit, Nev., Fort Abraham Lincoln, Dak., and Dodge City, Kan., trace; Fort Wallace, Kan., 0.01 in.; North Platte, 0.03; Fort McPherson, Neb., and Fort Buford, Dak., 0.10; Fort Fetterman, Wy. Ter., and Corning, Mo., 0.13; Stockton and Pilot Point, Tex., and La Mesilla, N. M., 0.14; Socorro, N. M., 0.15; Cheyenne, 0.20; Camp Sheridan, Neb., and Fort Hale, Dak., 0.22; Sidney, Neb., 0.24; Morrilton, Dak., 0.25; Pembina, Dak., and Winnemucca, Nev., 0.26; Fort Stevenson, Dak., 0.27; Santa Fe., 0.28; Burkes, Ariz. and Salt Lake City, 0.29; Bismarck and Fort Gibson, 0.30; Prescott, Ariz., 0.35; Denver, 0.38; Olivet, Dak., 0.39; Fort Garland, Col., and Wellington, Kan., 0.46; Silver City, N. M., 0.47; Fort Douglass, Utah, 0.52; Holton, Kan., 0.53; Manhattan, Kan. and Umatilla, Or., 0.56; Fort Sill, Ind. Ter., and Creswell, Kan., 0.58; Deadwood, 0.59; Genoa, Neb., 0.60.

Rainy Days.—The number of days on which rain or snow has fallen, varies as follows: New England, 9 to 21; Middle Atlantic States, 11 to 20; South Atlantic States, 6 to 19; Eastern Gulf States, 5 to 12; Western Gulf States, 7 to 12; Lower Lake region, 13 to 20; Upper Lake region, 12 to 21; Ohio valley and Tennessee, 11 to 17; Upper Mississippi valley, 10 to 15; Missouri valley, 1 to 9; Red River of the North valley, 5 to 7; Eastern Rocky Mountain Slope, 2 to 13; Texas, 2 to 11; Rocky Mountains, 1 to 8; Middle Plateau, 6 to 10; California, 5 to 9; Oregon, 12 to 23.

Cloudy Days.—The number varies in New England from 9 to 16; Middle Atlantic States, 5 to 14; South Atlantic States, 8 to 17; Eastern Gulf States, 3 to 20; Western Gulf States, 5 to 14; Lower Lake region, 8 to 17; Upper Lake region, 8 to 17; Ohio valley and Tennessee, 8 to 15; Upper Mississippi valley, 9 to 14; Missouri valley, 7 to 12; Red River of the North valley, 6 to 9; Eastern Rocky Mountain Slope, 4 to 10; Texas, 0 to 16; Rocky Mountains, 0 to 6; Middle Plateau, 6 to 19; California, 1 to 10.

Hail was reported in the various states on the following days: New Hampshire, 3rd, 6th; Massachusetts, 12th; Connecticut, 25th; New Jersey, 13th, 31st; Pennsylvania, 6th, 12th, 20th; Maryland, 20th; Ohio, 23rd; Indiana, 11th, 24th; Illinois, 29th; Tennessee, 21st, 22nd; Mississippi, 22nd; Louisiana, 22nd; Texas, 31st; Missouri, 29th; Kansas and Nebraska, 29th; Iowa, 9th, 19th, 24th, 29th.

Snow fell on the following dates in the various districts: New England, 1st, 3rd, 4th, 6th, 7th, 8th, 9th, 11th, 12th, 13th, 15th to 31st; Middle Atlantic States, 3rd, 6th, 10th, 11th, 12th, 13th, 14th, 15th, 20th, 22nd, 23rd, 27th, 30th, 31st; North Carolina, 13th; Tennessee, 12th; Lower Lake region, 1st, 11th, 12th, 13th, 15th, 20th, 21st, 22nd, 23rd, 24th, 29th, 31st; Ohio valley, 5th, 12th, 13th, 15th, 20th, 22nd, 23rd, 25th; Upper Lake region, 8th, 9th, 10th, 11th, 13th, 14th, 15th, 17th, 19th, 20th, 21st, 22nd, 23rd, 26th to 31st; Upper Mississippi valley, 9th, 10th, 11th, 13th, 19th to 31st; Missouri valley, 6th, 8th, 10th, 11th, 19th to 23rd, 24th to 31st; Rocky Mountains, 8th, 9th, 10th, 12th, 13th, 14th, 15th, 19th, 21st, 22nd, 23rd, 25th, 26th, 27th, 28th, 29th; Middle Plateau District, 8th, 9th, 10th, 14th, 15th, 19th, 22nd, 23rd, 25th, 27th, 28th, 29th. In Arizona on the 28th a very heavy snow-storm, accompanied with high winds. California, 9th, 25th, 26th, 27th, 28th; on the 26th snow fell to the depth of 2 inches at several places, and in relation to which the following notes are of interest: Shasta, snowing all day, very cold; Watsonville, rain and snow in morning, more snow fell than at any time for last 15 years; Calistoga, snow 1 inch deep in morning, heaviest fall for past 6 years; Davisville, began snowing at daylight, $\frac{1}{2}$ inch fell in 3 hours; Santa Rosa, began snowing at midnight, first time snow has remained on ground for past 6 years; Napa, 7 a. m., temperature 34°, 2 inches of snow in valley and on surrounding hills, much heavier on mountains at head of valley, heaviest snow for past 6 years; Ukiah, 4 a. m. to noon, severe storm, 2 inches of snow here, at Low Gap 5 inches, and at Little Lake, 4 inches; Salinas, 7 a. m., rain turned to heavy snow, which fell for 2 hours, first snow on record in Salinas valley; Gonzales, 7. 0 a. m., light snow, the last snow occurred about 10 years ago; Santa Paula, snow lower on mountains than for past 9 years; On the 27th at Los Angeles the snow-fall was the heaviest ever known in that section; first snow for past 14 years. At Grass Valley, 8 p. m., the snow was 6 in. deep and falling fast; at Georgetown, 8 p. m., 12 in. deep; at Rio Vista, 1 inch and at Dixon, at 6 p. m., it was snowing hard. On the 28th, at Visalia, first snow for the past 11 years; at Santa, San Joaquin county, 28th, snow covered the hills and valleys. Campo, 28th, clear sky again after the most severe snow-storm for many years, snow 3 feet all over the high mountains. Washington Ty., 2nd, 3rd, 5th, 8th, 9th, 10th, 11th, 12th, 25th.

Largest Monthly Snow-falls.—Summit, Cal., 66.00 inches; Pikes Peak, 42.60 in.; Truckee, Cal., 29.50 in.; Mt. Washington, 25.60 in.; Grafton, N. H., 22.75 in.; Hermosa, Col., 22.00 in.; Escanaba, 20.60 in.; Cornish, Me., and Strafford, Vt., 19.00 in.; Woodstock, Vt., Neillesville, Wis., and Tehachapi, Cal., 18.50 in.; Dunbarton and Antrim, N. H., 17.00 in.; Embarrass, Wis., 16.50 in.; Northport, Mich., 16.10 in.; Auburn, N. H., 14.50 in.; Gardner, Me., 14.00 in.; Orono, Me., Contoocookville, N. H., Lunenburg, Vt., and Keene, Cal., 13.00 in.; Newport, Vt., 12.50 in.; Duluth, 9.00 in.; Catawissa, Pa., 8.10 in.

Snow from a Cloudless Sky.—Bismarck, Dak., 29th.

The *depth of snow on ground at end of month* was reported as follows:—In Maine, from 3 to 10 in.; New Hampshire, 2 to 10 in. on the low-lands and 12 to 36 in. on the summit of Mt. Washington; Vermont, 1 to 12 in.; New York, trace to $\frac{1}{2}$ in. in the interior; Lower Lake region, trace to $\frac{1}{2}$ in.; West Virginia, trace; Michigan, $\frac{1}{2}$ to $\frac{1}{2}$ in. in the interior; Upper Lake region, $\frac{1}{2}$ in. at Alpena to 20 in. at Duluth; Wisconsin, trace to $8\frac{1}{2}$ in.; Minnesota, $1\frac{1}{2}$ to 6 in.; Iowa, $\frac{1}{2}$ to $2\frac{1}{2}$ in.; Nebraska, trace to $1\frac{1}{2}$ in.; Dakota, $\frac{1}{2}$ to $2\frac{1}{2}$ in.; Wyoming Territory, 2 in.; Colorado, 3 to 24 in. on the low-lands and 6 to 45 in. on the summit of Pike's Peak; New Mexico, 1 in.; Nevada, trace to 3 in.

Floods.—New Orleans, La., 30th, high water damaged the levee both above and below the city.

RELATIVE HUMIDITY.

The percentages of mean relative humidity for the month range as follows: New England, 70 to 84; Middle Atlantic States, 72 to 85; South Atlantic States, 71 to 88; Eastern Gulf States, 72 to 81; Western Gulf States, 67 to 81; Lower Lake region, 70 to 80; Upper Lake region, 66 to 80; Ohio valley and Tennessee, 60 to 74; Upper Mississippi valley, 66 to 74; Missouri valley, 62 to 83; Red River of the North valley, 92 to 95; Eastern Rocky Mountain Slope, 49 to 63; Texas, 22 at Stockton to 75 at Brackettsville and Laredo; Western Plateau, 40 at Yuma to 65 at Boise City; California, 65 to 80; Oregon, 69 to 82. *High stations* report the following averages not corrected for altitude: Mt. Washington, 86.5 per cent. Pike's Peak, 52.4; Denver, 39.8; Cheyenne, 38.7; Virginia City, 53.3; Santa Fe, 44.6.

WINDS.

The *prevailing direction of the winds* for the month is shown by arrows flying with the wind, on chart No. II. In general they agree with what might be expected from the distribution of pressure, being *north-erly* along the Atlantic coast and in the extreme Northwest; *southerly* from the Gulf coast to the Lakes, over the Plateau districts, in the Sacramento valley, Oregon and Washington Territory; at San Diego and San Francisco the prevailing wind was northerly. The *maximum velocities*, as recorded by self-registers, have been noted in the description of high and low areas. The *maximum* on the summit of Pike's Peak SW. 95 miles occurred on the 8th, and on the summit of Mt. Washington, NW. 138 miles on the 10th, both of them during the passage of low area No. V.

Total Movements of the Air.—The following are the *largest* total movements recorded in miles at the Signal Service stations during the month: On the summit of Pike's Peak, 21,238 miles; Cheyenne, 11,789; Cape Lookout, N. C., 11,181; Thatcher's Island, Mass., 11,081; Portsmouth, N. C., 10,734; Kittyhawk, N. C., 10,574; Milwaukee, 10,330; Sandusky, 10,142; Sandy Hook, 9,911; Cape Hatteras, 9,587; Cape May, 9,425; Key West, 9,110; Barnegat, N. J., 8,987; Burlington, Vt., 8,867; Eastport, 8,798; Cape Henry, 8,788; North Platte, 8,769. The *smallest* are La Mesilla, N. M., 1,541 miles; Nashville, Tenn., 1,692; Visalia, Cal., 1,871; Lynchburg, Va., 1,958; Uvalde, Tex., 2,263; Augusta, Ga., 2,380; Socorro, N. M., 3,031; El Paso, Tex., 3,119; Davis, 3,137; Los Angeles, Cal., 3,214; Silver City, N. M., 3,231; Montgomery, 3,254; San Antonio, 3,274; Salt Lake City, 3,516; La Crosse, 3,520.

Sand Storms.—Burkes, Ariz., 26th, 27th.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for January, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 84.4 per cent. The percentages for the four elements are: Weather, 86.9; Direction of the Wind, 83.2; Temperature, 84.5; Barometer, 82.7 per cent. By geographical districts they are: for New England, 85.8; Middle States, 85.8; South Atlantic States, 84.4; Eastern Gulf States, 80.7; Western Gulf States, 80.7; Lower Lake region, 84.3; Upper Lake region, 87.8; Tennessee and the Ohio valley, 84.9; Upper Mississippi valley, 84.9; Lower Missouri valley, 82.7; Northern Pacific region, 84.7; Central Pacific coast region, 90.3; Southern Pacific coast region, 96.0. There were 10 omissions to predict out of 3,813, or 0.26 per cent. Of the 3,803 predictions that have been made, 156, or 4.10 per cent, are considered to have entirely failed; 129, or 3.39 per cent, were one-fourth verified; 471, or 12.39 per cent, were one-half verified; 421, or 11.07 per cent, were three-fourths verified; 2,626, or 69.05 per cent, were fully verified, so far as can be ascertained from the tri-daily weather maps.

Cautionary Signals.—160 Cautionary Signals were displayed during the month, of which 119, or 74.4 per cent., were justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of the station. 46 Off-shore Signals were displayed, of which 40, or 87.0 per cent, were fully justified; 42, or 91.3 per cent, were justified as to direction; 41, or 89.1 per cent, were justified as to velocity; and 3, or 6.4 per cent, were not justified either as to direction or velocity. 29 of the Off-shore were changed from Cautionary. 206 Signals of both kinds were displayed, of which 159, or 77.0 per cent, were fully justified. The above does not include signals ordered for 50 display stations, where the velocity is only estimated. 48 cases of winds of 25 miles and over per hour, from scattering stations, were reported, and for which signals had not been ordered. Eight signals were reported late.